

Sediments RI/FS Work Plan

I & J Waterway Bellingham, Washington

Prepared by:

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RETEC Project Number: PORTB-18449-100

Prepared for:

**Port of Bellingham
1801 Roeder Avenue
Bellingham, Washington 98225**

July 27, 2005

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1 Introduction

This document summarizes the work to be performed during a sediments Remedial Investigation and Feasibility Study (RI/FS) at the I & J Waterway Site (Site) in Bellingham, Washington. This work will be performed by The RETEC Group, Inc. (RETEC) under a Professional Services Agreement with the Port of Bellingham (Port).

The RI/FS will be conducted to determine appropriate remedial measures to address contaminated sediments within the Site and to select a final remedy for sediment cleanup in compliance with the requirements of the Model Toxics Control Act (MTCA) and the Sediment Management Standards (SMS).

1.1 Site Description and Ownership

The Site is located between Hilton Avenue and Bellwether Way on the Bellingham waterfront and was formerly called the “Olivine-Hilton sediment Site” (Figure 1-1). The Site includes areas of contaminated marine sediments in both the I & J Waterway and nearby berthing areas. The Waterway is located primarily on a state-owned aquatic land. The Port owns the berthing areas on the south side of the waterway and the surrounding uplands. The Waterway includes a federally authorized navigation channel with a current authorized channel depth of 18 feet below Mean Lower Low Water (MLLW). The U.S. Coast Guard owns the property north of the Site and berths vessels within the waterway and northern berth areas.

The upland areas near the Site include the former Olivine Corporation lease area and a property to its southwest that is currently leased to Bornstein Seafoods.

The ownership and history for the Site and adjacent upland properties were defined in the Phase 2 Sediment Sampling Report (ThermoRetec, 2001). The Whatcom Falls Mill Company owned and operated a lumber mill in the vicinity of the Site between the early 1900’s and 1940. In 1944, these properties were acquired by the Port and leased to tenants, including Bayshore Lumber, who operated a lumber company (1947-1962) and H&H Products, who managed the same lumber mill (1963-1972) at the head of the waterway. The Olivine Corporation operated a rock crushing plant for the mineral olivine between 1963 and 1992. During that period, dust and wastewater were periodically released to the waterway. North Pacific Frozen Products managed a food processing plant between 1946 and 1959 in the location of the current Bornstein lease. Bornstein Seafoods has operated a seafood processing plant from 1959 to present in that location. Bornstein Seafoods provided diesel fuel to boats at its dock between 1960 and the early 1980s. A fire destroyed the main Bornstein Seafoods building in July of 1985. Fire

suppression efforts lasted for two days, during which time fire control water was discharged directly to the Site.

Environmental impacts to the Site as documented by previous studies include contaminated surface sediments containing elevated concentrations of bis(2-ethylhexyl)phthalate. The elevated phthalate concentrations are located around the Bornstein Seafoods lease area in the vicinity of the 1985 fire.

Additional sources of phthalate contamination were previously investigated in leachate from the Roeder Avenue landfill and compressor oil from a compressor on the Bornstein dock. Concentrations of bis(2-ethylhexyl)phthalate in leachate from the Roeder Avenue landfill were determined to be below MTCA criteria under a direct discharge scenario (ThermoRetec, 2001b). In addition, as part of the Port's Environmental Compliance Assessment Program (ECAP) following the Phase 2 investigation, phthalates were measured in trace amounts in compressor oil from a compressor located on Bornstein's dock. It was determined that thousands of gallons of compressor oil would have needed to have been spilled to create the existing condition in the sediments.

Surface sediments are also contaminated with nickel in the southeastern portion of the waterway adjacent to the former Olivine Corporation lease area. Nickel is a constituent within olivine ore. Additional contaminants present in subsurface sediments include mercury, phenols, and polynuclear aromatic hydrocarbon (PAH) compounds (ThermoRetec, 2001).

1.2 Objectives of the RI/FS

As owner of the berthing areas and properties adjacent to the waterway, the Port is performing this RI/FS to evaluate Site cleanup requirements under applicable regulations. The RI/FS will comply with cleanup requirements administered by the Department of Ecology (Ecology) under MTCA and SMS regulations. The RI/FS will be used to define the remedial measures required to clean up the I & J Waterway sediments under these regulations.

Sediments in the I & J Waterway will be investigated in two phases. The first phase consists of determining the surficial extent of contamination. Appendix A provides sampling and analysis methods for the initial phase of field activities, which includes surface sediment sampling. The second phase consists of subsurface sampling. As described in Appendix B, data will be collected to quantify depths and volumes of impacted sediment.

Each phase together is intended to collect sufficient data to fully characterize the extent of surface and subsurface contamination and to comply with MTCA and SMS requirements for RI/FS evaluations. However, the second phase is also intended to characterize the sediments for suitability of open-water disposal under the Puget Sound Dredged Disposal Analysis Program

(PSDDA). This assessment will be used to evaluate remedial alternatives as part of the Feasibility Study for the Site.

The I&J Waterway Site is one of several cleanup sites being addressed as part of the Bellingham Bay Demonstration Pilot; a bay-wide, multi-agency initiative integrating sediment cleanup, control of pollution sources, habitat restoration, and aquatic/shoreline land use.

The RI/FS is being performed under an Agreed Order with Ecology (No. DE 1090). At the completion of the RI/FS, the Port and Ecology will evaluate the administrative options for implementing any necessary remedial actions. It is anticipated that the final cleanup action will be conducted under a MTCA Consent Decree.

This document provides an overview of the investigation and engineering tasks to be performed during the RI/FS. Investigation tasks are described in Section 2 and 3 of this report. Engineering tasks are described in Section 4. Appendices A and B describe sampling plans for surface and subsurface investigations, respectively.

2 Basis and Rationale for RI/FS Scope

This section provides an overview of previous investigation findings in and around the Site and presents the rationale on which the scope of work for the Site RI/FS is based. Sections 3 and 4 of this Work Plan provide a description of the sampling, analysis, and engineering tasks to be completed, consistent with the rationale presented in this section.

2.1 Incorporation of Previous Findings

This document incorporates and builds upon sediment sampling data collected in previous investigations. The most recent sampling effort consisted of Phase 2 sediment sampling at the Site during summer of 2000 (ThermoRetec, 2001a). That study provided extensive baseline information about the history of the Site and the types and distribution of sediment contamination. That information has been integrated, along with other existing information to focus the efforts of this RI/FS. A brief description of these existing data and conclusions is provided below.

RI/FS Focus Area

The focus of this investigation is a contiguous area within the Site where elevated concentrations of sediment contaminants have been detected (Figure 1-1). Phase 2 sampling involved a preliminary characterization of the lateral extent of contamination within the bioactive zone (top 0 to 12 cm) in the Site sediments. Figure 1-2 shows the locations and extent of contamination quantified during the Phase 2 sampling event, including delineations for values exceeding numeric Sediment Quality Standards (SQS) and Minimum Clean-Up Levels (MCUL), as defined in SMS regulations (ThermoRetec, 2001a).

The investigation area of the RI/FS (Figure 1-1) includes all contiguous areas within the Site where exceedances of the SQS or MCUL chemical criteria have been detected. The RI/FS activities will also include sampling of adjacent areas to confirm the lateral extent of surface contamination.

Contaminants of Concern

Table 2-1 summarizes the list of contaminants for which exceedances of the current SQS or MCUL values have been noted from the Phase 2 Investigation (ThermoRetec, 2001a) and from previous Hart Crowser (1997) and Anchor Environmental (1999) investigations. These contaminants will be carried forward as the contaminants of concern for the RI/FS investigations. The testing program described in Section 3 incorporates testing for all compounds and related compounds shown in Table 2-1.

Table 2-1 Contaminants of Concern for the I&J Waterway Sediments

Group	Compound	Number of Samples >SQS	Number of Samples >MCUL	Maximum Enrichment Ratio
		Surface Sediment Quality		
Heavy Metals	Mercury	2	0	1.1
	Nickel	0*	0*	--*
Phthalates	Bis(2-ethylhexyl)phthalate	1	8	31.1
LPAHs	Acenaphthene	0	1	2.0
	Anthracene	1	0	0.2
	Fluorene	2	0	0.6
	Phenanthrene	2	0	2.3
	Total LPAH	1	0	1.3
HPAHs	Chrysene	2	0	0.6
	Benzo(a)anthracene	1	0	0.6
	Fluoranthene	1	0	0.8
	Total HPAH	1	0	1.1
Miscellaneous	Phenol	1	1	1.3
	Dibenzofuran	1	0	0.5
		Subsurface Sediment Quality		
Heavy Metals	Mercury	0	1	1.5
Miscellaneous	2,4-methylphenol ¹	1	1	21.0
	2-methylphenol ¹	0	1	6.3
	4-methylphenol ¹	0	1	2.2

NOTE:

SQS = Sediment Quality Standards

MCUL = Minimum Clean Up Level

LPAH = low molecular weight polynuclear aromatic hydrocarbons

HPAH = high molecular weight polynuclear aromatic hydrocarbons

Maximum Enrichment Ratio = the ratio between the highest detected concentration and the MCUL

¹ Concentrations of 2,4-methylphenol, 2-methylphenol, and 4-methylphenol are included as COCs on Table 2-1, however, they were measured at values above the linear range of the detector (E-flagged) and are not necessarily considered valid data. These compounds will be measured in each sample as part of the full list of SMS chemicals.

* = SQS and MCUL values for nickel are not currently defined. Consistent with Ecology policies, biological effects criteria defined under SMS are used to evaluate the SMS compliance of constituents for which SQS and MCUL chemical criteria are not defined.

Table 2-1 summarizes measured enrichment ratios for Site surface sediments. The “enrichment ratio” is the ratio between a measured sediment chemical concentration and the MCUL numeric criteria for that chemical. An enrichment ratio of 2.0 means that a chemical is present at a concentration

twice the MCUL value. Enrichment ratios are simplified ways to express the relative concentrations of different chemicals in Site sediments.

At the Site, bis(2-ethylhexyl)phthalate is the compound with the highest measured enrichment ratios. It is also the compound present in excess of MCUL values in the greatest number of samples. Areas of elevated phthalate concentrations were localized around the Bornstein Seafoods dock area as shown in Figure 1-2. Two surface sediment samples collected from phthalate-impacted areas were tested for biological effects using SMS bioassays in 1998. These samples were collected from stations AN-SS-45 and from station AN-SS-47, confirming the presence of biological effects in Site sediments and defining a preliminary correlation between the level of biological effects and the sediment phthalate concentrations.

Other contaminants include LPAHs with enrichment values ranging from 0.2 to 2.3, and HPAHs with enrichment values ranging from 0.6 to 1.1. Nickel was detected in surface sediment samples in the southeastern portion of the waterway above PSDDA screening levels (SL), however, there are no SMS criteria for nickel. Mercury was below SQS criteria in surface sediments in 2000, but contained slightly elevated concentrations in 1996 and 1998. This is consistent with other reports that suggest mercury contamination is absent in the surface but present in subsurface sediments. Mercury contamination in the I&J Waterway Site is associated with elevated mercury concentrations located in sediment in the Whatcom Waterway. Several methylphenol compounds (2,4-methylphenol, 2-methylphenol, and 4-methylphenol) were also elevated above MCUL criteria in subsurface sediments, although the concentrations were above the linear range of the detector (ThermoRetec, 2001). Based on these previous findings, mercury and methylphenols will be carried forward as contaminants of concern for the Site in subsurface sediments.

2.2 Evaluation of Cleanup Requirements under SMS and MTCA

The Sediment Management Standards (SMS) provide a uniform set of rules and procedures to evaluate the clean up of contaminated sediment sites (WAC 173-204). The SMS regulations are enforced under the Model Toxics Control Act (MTCA; Chapter 70.105D RCW). All activities performed under this RI/FS will be consistent with those regulations.

Under the SMS, two sets of cleanup criteria are established. The first of these, the Sediment Quality Standard (SQS), is a criterion below which no adverse effects occur, “including no acute or chronic adverse effects on biological resources and no significant health risk to humans” (Ecology, 1995). The SQS are a regulatory and management goal for the quality of sediments throughout the state. The second criterion, the Minimum Cleanup Level (MCUL), is a minor adverse effects level, which is the minimum level to be achieved in all cleanup actions under the SMS. SQS and MCUL standards

apply to surface sediments, and to subsurface sediments which could be exposed by natural or anthropogenic processes.

Compliance with SMS criteria can be assessed using chemical and/or biological sampling data. Protocols for both chemical and biological testing are defined under the Puget Sound Protocols (Puget Sound Estuary Program, 1986) and in amendments to those protocols as established by Ecology. As described in Section 3, chemical testing methods developed under the PSDDA program will also be incorporated where appropriate for evaluation of dredged material management options.

Sediment surface sampling will be used during the RI/FS to better define the spatial extent of contaminated surface sediments. Surface samples, or “grabs” will be located throughout the Site, including on the eastern, northern, and western boundaries of the Site. Chemical testing will be used to evaluate compliance of surface sediment samples with SMS numeric criteria. Any surface sediment samples with chemical concentrations in excess of SQS chemical criteria or as determined by Ecology will be tested for biological effects. Biological testing will be performed using appropriate bioassays as specified in WAC 173-204-310(2)a and WAC 173-204-315 and recent Ecology revisions to those testing protocols. Sediment samples that exceed the SMS chemical criteria but which pass the confirmatory bioassays will be designated as passing the SQS or MCUL, consistent with SMS regulations. For nickel, the PSDDA screening level (SL) will be used as a conservative screening level analogous to the SQS. Samples exceeding the nickel PSDDA SL will be tested for biological effects.

The definition of the nature and extent of subsurface sediments is necessary in order to evaluate potential sediment management options and remedial alternatives. Sediment remedial alternatives can include the use of natural recovery, capping or removal with treatment or disposal. The thickness and characteristics of subsurface sediments in impacted Site areas will be defined as part of the RI/FS. Specifically the Site has been divided into a series of potential dredged material management units (DMMU) for evaluation of suitability of sediment for open-water disposal under the PSDDA program. Within each DMMU containing impacted sediments, subsurface testing will be performed. Although core locations are designed to comply with the PSDDA program, the subsurface data collected will aid in determining vertical extent of contamination for the RI/FS. Testing results will be compared to SMS criteria and to the criteria applicable to potential treatment or disposal alternatives. Results of surface and subsurface testing will then be used to assess the need for Site remediation, screen potential remedial technologies, and evaluate remedial alternatives consistent with the MTCA and SMS regulations.

2.3 Rationale for RI/FS Scope of Work

The scope of investigation and engineering activities to be performed during the RI/FS is consistent with MTCA and SMS requirements. Principal investigation tasks to be performed include the following:

- Collect surface sediment data in areas where existing data are inadequate to determine compliance with SMS chemical criteria, such that the lateral extent of surface sediment contamination can be characterized.
- Perform confirmatory biological testing in those areas that exceed the SMS chemical criteria and in those areas that may cause deleterious benthic impacts, as determined by Ecology.
- Use core sampling to characterize the vertical extent of contamination in subsurface sediments and to evaluate sediment management alternatives, including the suitability of unconfined, open-water disposal under PSDDA.
- Collect bathymetric information at each sampling location in support of the engineering analysis for remedial alternatives.
- Collect additional site information as required to support the analysis of remedial alternatives.

The feasibility study will evaluate remedial alternatives in compliance with SMS, and MTCA remedy selection requirements. This analysis will address the effectiveness, implementability and cost of different cleanup technologies, ranging from aggressive removal technologies to containment and natural recovery technologies. Where appropriate, the feasibility study will evaluate different remedial technologies for specific areas of the site or for different contamination levels. Specific analyses to be performed during the feasibility study include the following:

- Analysis of prop wash effects and bathymetric limitations relevant to the use of capping or natural recovery technologies.
- Evaluation of logistical constraints (e.g., presence of docks and pilings) relevant to dredging activities, as well as the evaluation of methods, which could be used to overcome those constraints.
- Evaluation of current and future land uses for each remedial alternative.
- Evaluation of remedial costs for different cleanup levels (i.e., costs associated with remediation to the SQS versus those associated with cleanup to the MCUL and human health criteria).
- Evaluation of total remedial costs for a range of alternatives.

Collection of surface sediment and subsurface sediment samples are described in more detail in Section 3 and in the Sampling & Analysis Plans included as Appendices A and B, respectively.

3 Remedial Investigation Tasks

This section contains an overview of the field investigation tasks to be performed as part of the RI/FS. These activities will be performed within the RI/FS investigation area identified in Figure 1-1.

The RI/FS investigations will be used to define any Site areas requiring remediation. The sampling activities will include the collection of surface grab samples for chemical analysis and bioassay testing. Surface samples will define the lateral extent of chemical contamination and biological effects. The extent of subsurface coring will be contingent upon surface grab results. Subsurface samples will define the vertical extent of chemical contamination and will provide data necessary for evaluation of potential remedial alternatives.

3.1 Primary Investigation Tasks

The RI/FS sediment investigations will be conducted in two phased field efforts. The first phase will consist of surface sampling, chemical analysis, and bioassay testing. The second phase will consist of subsurface sampling and chemical analysis to determine the composition and thickness of contaminated sediments. The subsurface data will be used to first evaluate the nature and extent of contamination and (secondarily) to evaluate sediment management alternatives as part of the FS. The program of surface sampling is defined in detail in Appendix A. The subsurface coring program is defined in detail in Appendix B.

All investigation activities will be conducted consistent with a Site Health and Safety Plan (HASP). The Site HASP will be prepared consistent with state regulatory requirements. The project HASP will be submitted to Ecology at least 30-days prior to mobilization for field investigation activities.

Surface Grab Sampling

Surface sediment samples will be collected within the RI/FS investigation area to help define the extent of surface contamination. Samples will be collected within the area of SMS exceedances and beyond these boundaries. Grab samples will be analyzed for chemical parameters, and those that fail SQS chemical criteria will be tested with bioassays.

Chemical Analysis of Grab Samples

Thirteen locations within the Site will be sampled for surface sediments by van Veen grabs, as described in Appendix A. These samples will be analyzed for SMS chemical parameters, including volatile and semivolatile organics, pesticides and PCBs, metals, total organic carbon (TOC), ammonia, total sulfides, grain size, and total solids. Metals analysis will include nickel.

Bioassay Sampling

At each of the grab sampling locations, additional volume will be collected and archived to be used for bioassay testing. If any of the surface sediments should fail SQS chemical criteria, those stations will be subjected to bioassay testing along with those requested by Ecology. Bioassays will be performed as described in Appendix A. As described in section 2.2, samples with nickel at concentrations in excess of the PSDDA screening level will be tested using bioassays, along with those samples requested by Ecology.

Under SMS regulations, the interpretation of bioassay data requires the collection and analysis of clean reference sediment, similar in physical characteristics to the test sediments. One of more reference samples will be collected for use in the RI/FS confirmational bioassays, based *a priori* on the grain size and organic carbon content of test sediments. These samples will be analyzed for bioassays as well as for the same chemical parameters as grab samples at the Site.

Subsurface Core Sampling

The composition and thickness of the contaminated sediments will be determined in the area defined by surface sediment sampling. Coring will be conducted with a vibracore, as described in Appendix B, and will be tested for the full suite of SMS chemicals. All chemicals tested will be compared to SMS and PSDDA criteria. Biological testing of subsurface sediments will be performed on samples from dredged material management units if PSDDA screening levels are exceeded.

3.2 Additional Investigation Tasks

As part of the field investigation program, additional data will be collected to support the engineering analyses to be performed as part of the RI/FS.

Analysis of Current and Future Land Uses

Land use information and anticipated navigation requirements of the I&J Waterway and berth areas will be collected for the current primary users of the waterway. The users include Bornstein Seafoods, the US Coast Guard, and users of the marina entrance at the opening of the waterway. Additional analysis of impacts of each remedial alternative on existing and future habitat, land use, and mitigation issues will be carried out as part of the feasibility study, as discussed in Section 4.3.

Bathymetric Data

A complete bathymetric survey will be conducted as part of the RI/FS investigation. Water depths will be measured from a boat using a transducer suspended from the boat while travelling first parallel and then perpendicular to track lines. Positions will be recorded using a DGPS unit at time of data collection. Water depths will be measured from a boat using lead line or

transducer equipment, depending on site conditions. Discrete measurements will be collected every 10 feet along transect survey lines spaced approximately 100 feet apart oriented perpendicular to shore. Positions will be recorded using a DGPS unit at time of collection. At least one longitudinal track line will be run parallel to shore to cross-reference the track lines.

Documentation of General Site Features

During the RI/FS investigations, additional data will be collected regarding the site features that may impact remediation activities. Specific observations include the following:

- Dock piling locations and types
- Over-water utilities or structures
- Shoreline armoring, bulkheads or other features relevant to Site remedial alternatives
- Bottom characteristics and sediment grain size

An updated base map will be prepared as part of the RI/FS for use during remedial alternatives evaluation.

3.3 Data Management, Reporting and QA/QC

Data collected during the field investigation program will be summarized in the RI/FS document. That document will include tabular and graphical summaries of all collected data. All laboratory reports and QA/QC summaries will be attached to the document as appendices. All chemical and biological testing data will be reported to Ecology electronically in SEDQUAL database format prior to final RI/FS approval.

4 Feasibility Study Tasks

4.1 Remedial Technology Screening

Once the areas and volumes of contaminated sediments have been determined, cleanup technologies will be screened for their ability to remediate these sediments. The screening will evaluate the implementability, effectiveness, and cost of each technology. Based on data collected to date, likely sediment remedial technologies which will be carried forward for further consideration at the Site include:

- Natural recovery
- Capping of contaminated sediments
- Dredging and disposal in an upland Subtitle D landfill
- Dredging with upland treatment
- Dredging with beneficial reuse or PSDDA disposal
- Mixtures of the above-listed technologies

Capping Technologies

As part of the technology screening for sediment capping, particular attention will be paid to the long-term effectiveness of this technology, as well as land use considerations.

Given the size of the vessels entering and exiting the I & J Waterway, prop wash is likely to be the dominant mechanism affecting the long-term effectiveness of sediment capping. An analysis of prop wash will be conducted using the methodology presented by the U.S. Army Corps of Engineers (ACOE). This analysis will specify minimum capping requirements at the Site.

Results of the bathymetry information collected during investigation activities will be used to evaluate the areas where capping is an option, given the need for a minimum depth of water at the Site. Where capping is determined to be impracticable, the technology will be excluded from further consideration in that area. The required cap thicknesses and any associated armoring will be assessed for each area for which capping is determined to be feasible.

Natural Recovery

Due to the presence of an active federal navigation channel and navigation berth areas within the site, natural recovery is not likely to be the primary remedial approach for the Site. However, it may impact the area and volume of sediments for which active remediation technologies are used. As part of the FS, the potential impact of natural recovery to the areas and the volumes requiring active remediation will be evaluated. The results of the prop wash

analyses performed as part of the capping analysis will be incorporated in the screening of natural recovery, along with natural recovery evaluations that were performed in the immediate vicinity of the Site as part of the Whatcom Waterway RI/FS (Anchor, 2000). The influence of natural recovery on contaminant concentrations will be assessed for each of the site areas.

Sediment Dredging Analysis

Dredging of contaminated sediments will be evaluated as part of the technology screening. The analysis will be used to define the procedures, practicability, and costs associated with removal of impacted sediments.

Knowledge of site bathymetry and sediment thicknesses collected during sampling and the location of fixed features at the Site (e.g., pilings) will be used to determine which areas are amenable to the use of dredging technologies. Structural stability of existing pilings and structures will be considered in evaluating remedial alternatives. Specific types of dredges that can be used (e.g., hydraulic or mechanical), rates of dredging, and issues involving water quality management will be assessed in this analysis.

The dredging analysis will be performed in parallel with the analysis of sediment treatment and disposal options. Where the costs and engineering alternatives associated with dredging are affected by the type of treatment/disposal alternative selected, these differences will be identified. The format of the cost estimates will permit direct comparison between technologies. The sampling plan in Appendix B evaluates the potential for beneficial reuse and for unconfined, open-water disposal under the PSDDA program. Appendix B includes maps defining preliminary dredged material management units based on existing site data and historical dredge records and bathymetric maps.

Beneficial Reuse and/or PSDDA Sediment Disposal

The disposal of the sediments at an established PSDDA disposal site will be evaluated as part of the RI/FS. Sediment must meet PSDDA requirements in order to qualify for unconfined, open-water disposal. These requirements are also used to evaluate beneficial reuse options.

Upland Treatment, Reuse and Disposal Technologies

Upland treatment, reuse and/or disposal technologies will be screened for application to the Site sediments. Specific treatment, reuse and/or disposal options to be evaluated include the following:

- Beneficial reuse as industrial soil consistent with applicable federal and state regulations
- Treatment and reuse as construction aggregate or cement admixture
- Treatment in a thermal desorption unit

- Disposal in a Subtitle D landfill
- Other commercially-available treatment/disposal alternatives as appropriate

4.2 Development of Remedial Alternatives

Following screening of remedial technologies, the technologies will be combined to create remedial alternatives for further evaluation in the feasibility study. The range of alternatives is expected to span technologies from natural recovery to complete removal. The range of alternatives will include consideration of special subareas of the Site (e.g., under-pier contaminated areas), which may require special technologies or for which remedial costs may be substantially different from other similarly contaminated site areas with different physical characteristics.

Detailed cost estimates and drawings will be prepared for each alternative evaluated. The format of the cost estimates will allow for direct comparison of costs between each alternative. Each alternative will be evaluated consistent with MTCA remedy selection requirements as defined in WAC 173-340-360.

Cost estimates will include both short-term and long-term costs, including the costs of mitigation for land use or habitat impacts as described below. The analysis of effectiveness will address the issue of long-term risks. Options to reduce these long term risks will be discussed where appropriate.

4.3 Analysis of Habitat, Land Use and Mitigation Issues

As part of the remedial alternatives analysis, habitat, land use and mitigation issues will be evaluated. The habitat analysis will address potential habitat impacts of each alternative, and will address any required mitigation measures under existing regulations. This analysis will address potential concerns associated with the Endangered Species Act.

Land use issues will be evaluated for each of the alternatives. Potential impacts on each of the following will be addressed:

- Existing uses and anticipated navigation for the I&J Waterway and berth areas
- Existing and anticipated uses of the adjacent upland properties
- Potential future uses of the site and neighboring properties, with a weighting toward those uses that are consistent with the City of Bellingham Shoreline Master Plan and the Washington State regulations for the management of state-owned aquatic lands (WAC

332), including the results of ongoing land use planning efforts and SMP revision.

- Consistency with the State Environmental Policy Act (SEPA) and with the Environmental Impact Statement (EIS) prepared by Ecology and cooperating agencies under the Bellingham Bay Demonstration Pilot (Ecology, 2000).

Where impacts to habitat or land uses would require mitigation, and where reasonable mitigation alternatives for mitigation are available, the costs and other requirements of these actions will be defined, discussed, and included as part of the alternatives evaluation process.

4.4 Selection of a Preferred Alternative

Selection of a preferred alternative will be performed after coordination with Ecology. The preferred alternative will be selected consistent with MTCA and SMS regulatory requirements.

4.5 Preparation of the RI/FS Report

The RI/FS report will be prepared as a draft for review and comment by Ecology. The draft RI/FS report will be submitted to Ecology for review. RETEC expects that Ecology will provide written comments on the RI/FS report. Written responses to these comments will be provided.

After the comments from Ecology have been addressed, a revised RI/FS report will be prepared by RETEC. The revised report will reflect the comments and responses from the draft RI/FS. This version of the RI/FS will be made available for public and stakeholder review during a 30-day public comment period as described in the Public Participation Plan (Ecology, 2004). The RI/FS will be finalized after completion of a public comment period.

5 Project Schedule

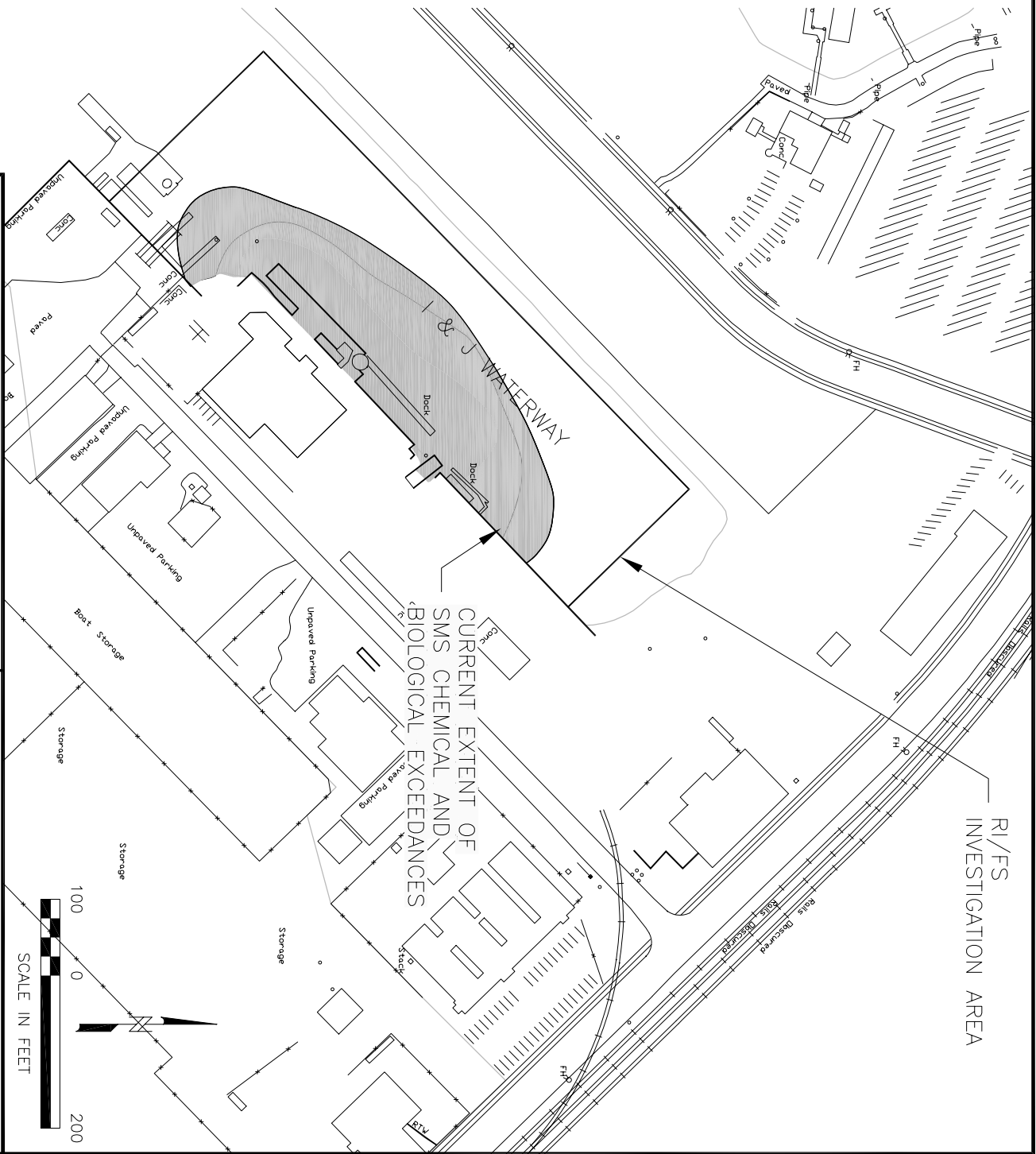
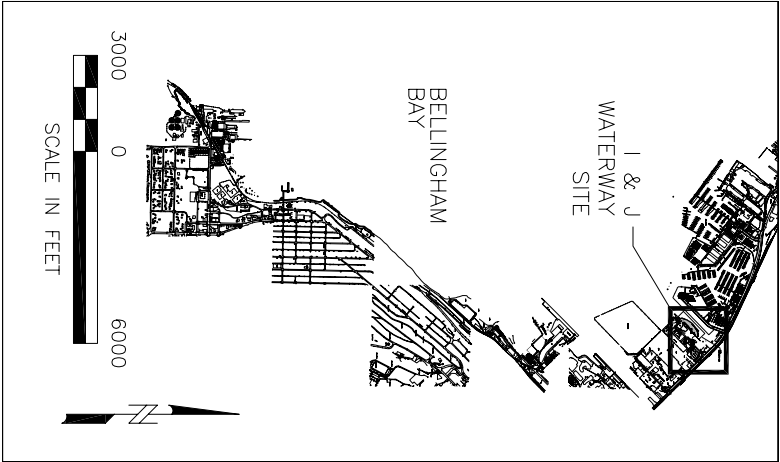
An overview of the project schedule is provided below in Table 5-1.

Table 5-1 Project Schedule

Key Dates	Project Tasks
September 2005	Surface sediment sampling and associated laboratory analysis
October 2005	Prepare Spatial Extent Report summarizing surface sediment results
January 2006	Sediment coring sampling and associated laboratory analysis
January 2006	Preparation of RI data summaries, Discussion of site cleanup levels with Ecology
February 2006	Technology Screening & Analysis of Remedial Alternatives
March 2006	Selection of Preferred Remedial Alternative, and Submittal of Draft RI/FS
June 2006	Submittal of Revised RI/FS

6 References Cited

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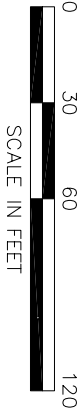
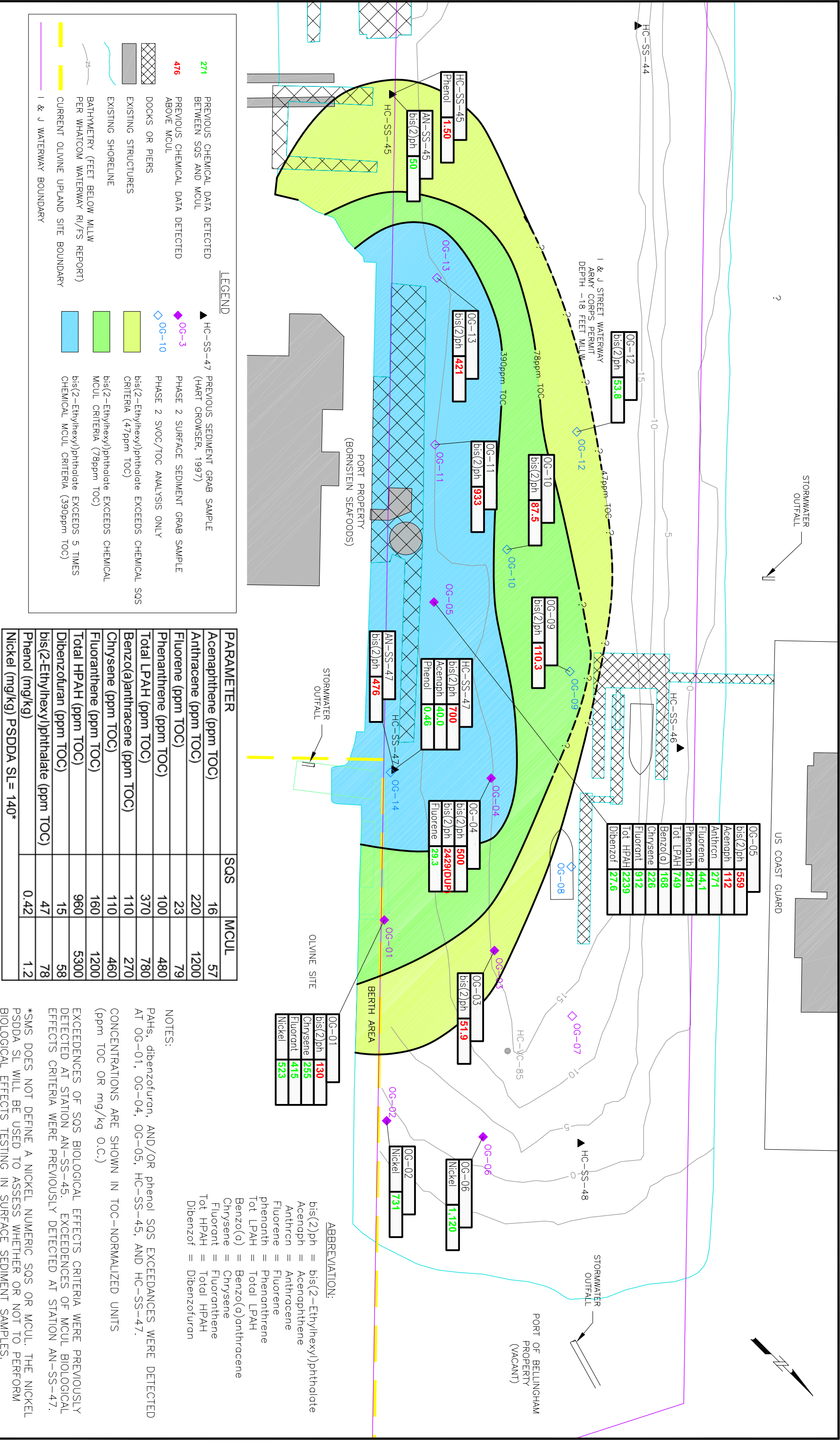


NOTE:

THE INVESTIGATION AREA MAY BE EXPANDED IF CONTAMINATION APPEARS TO EXTEND BEYOND THE CURRENT INVESTIGATION AREA.



I & J WATERWAY RI/FS WORK PLAN PORTB-18449-100		SITE LOCATION MAP	
DATE: 06/15/05	DRWN: A.S./SEA		FIGURE 1-1



SCALE IN FEET

DATE: 07/15/05	DRWN: AS/SEA	I & J WATERWAY RI/FS WORK PLAN PORTB-18449-100	SUMMARY OF PREVIOUS SURFACE SEDIMENTS EXCEEDENCES
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FIGURE 1-2